PERMIT TO CONSTRUCT ANALYSIS (PC)

COMPANY NAME **AEIS NUMBERS:**

Eastern Municipal Water District 13088
Moreno Valley

PERMITEE/OPERATOR **EQUIPMENT LOCATION**

SAME AS FORM 400A SAME AS FORM 400A

Applications(s): **See Below**

EQUIPMENT DESCRIPTION

APPLICATION NO. 476542

DIGESTER GAS TREATMENT SYSTEM AND FUEL CELL POWER PLANT CONSISTING OF:

1. KNOCKOUT TANK,
2. TWO HYDROGEN SUFLIDE REMOVAL VESSELS, APPLIED FILTER TECHNOLOGY, MODEL SULFRPACK, 8'-0" DIA.X 8'-0" H., EACH WITH 24,960 POUNDS MEDIA.
3. PARTICULATE FILTER.
4. PRECOOLER WITH DEMISTER.
5. TWO COMPRESSORS, EACH 300 SCFM, ELECTRICALLY DRIVEN.
6. GAS PRE-COOLER AND GAS REHEATER.
7. GAS COOLER AND DEMISTER.
8. TWO SILOXANE REMOVAL VESSELS, APPLIED FILTER TECHNOLOGY, MODEL SAGPACK, 3'-6" DIA. X 8'-0" H. BED DEPTH, EACH CONTAINING 2300 POUNDS MEDIA.
9. PARTICULATE FILTER.
10. THREE FUEL CELLS, FUELCELL ENERGY, MODEL DFC300MA, 900 KW MAXIMUM POWER OUTPUT, EACH WITH A FUEL PRECONVERTER.
11. THREE HEAT RECOVERY UNITS.

CONDITIONS (See Sample Permit):

APPLICATION NO. 474813

APPLICATION FOR A DEMINIMUS SIGNIFICANT REVISION TO THE TITLE V FACILITY PERMIT

BACKGROUND

The Eastern Municipal Water District (Moreno Valley), ID No. 13088, is a Title V and non-RECLAIM facility which operates a waste water treatment plant at this site. Application No. 473542 was filed on September 12, 2007, for a permit to construct a new digester gas treatment system and a 0.9 MW molten carbonate fuel cell, and application No. 474813 was filed on October 24, 2007, for a deminimus significant revision to the initial Title V facility permit issued on April 3, 2007.

PROCESS DESCRIPTION

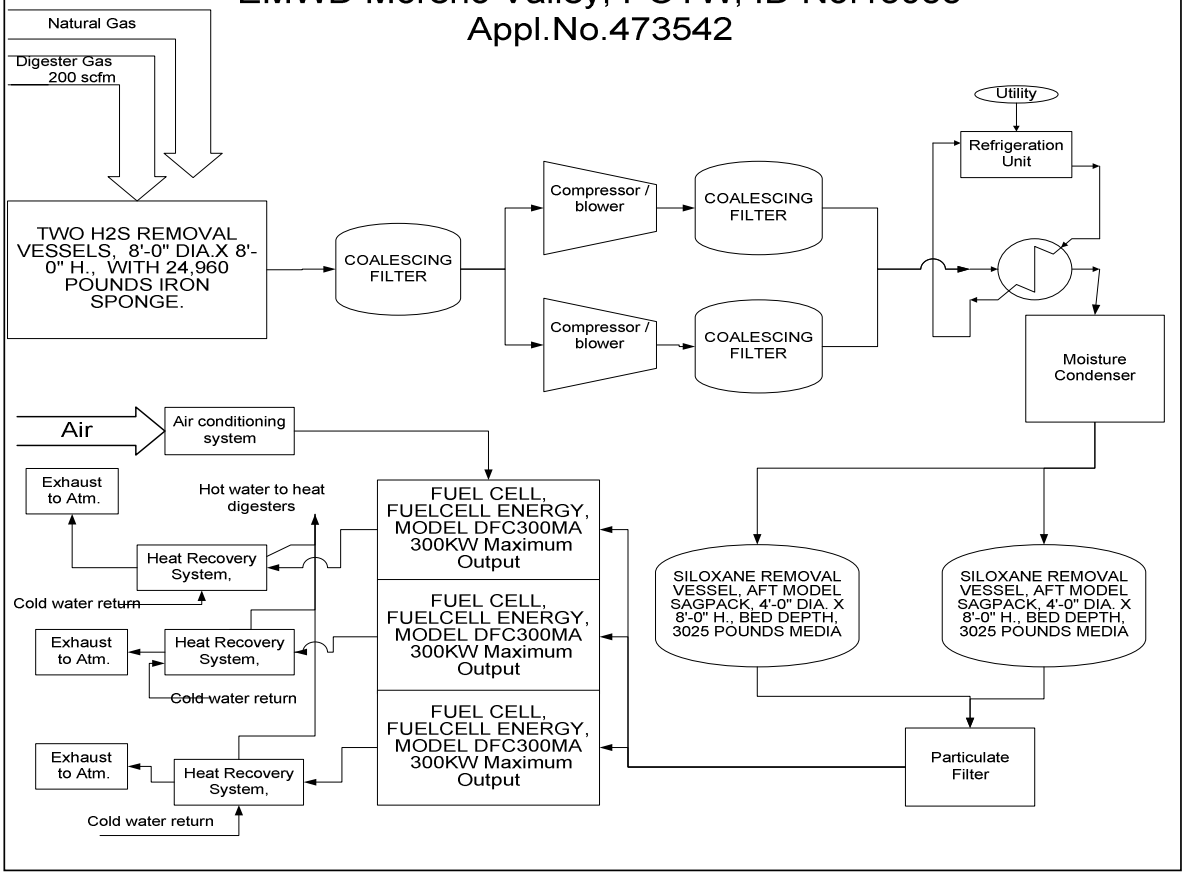
The digester gas treatment system is required to remove sulfur compounds and siloxanes from the biogas generated in the digester before the cleaned gas is consumed by a molten carbonate fuel cell. Figure 1 on the following page shows the configuration of the proposed gas treatment system.

Based on the proposed design specifications, the sulfur in the digester gas consists primarily of Hydrogen Sulfide, which has a maximum concentration of 160 ppmv. The concentration of mercaptans are expected to be below detection limits . The system is designed to treat a maximum of 300 standard cubic feet per hour of digester gas.

The first step in the treatment process is sulfur removal. H2S is removed by passing the digester gas through a vessel filled with activated carbon impregnated with Fe2O3 (Iron Sponge). Each H2S removal vessel contains approximately 25,000 pounds of media with a removal efficiency estimated at 95%, which enables the system to reduce the concentration of H2S in the treated gas to less than 3 ppmv and below the maximum tolerance of 6.1 ppmv specified for the fuel cell. Then a particulate filter is used remove any entrained particles from the H2S adsorbent, and moisture before the flow is directed to a compressor. After the compressor, a refrigerated cooler, reheater, condenser, and demister is used to remove moisture before the gas stream enters the siloxane removal vessels.

Each siloxane removal vessel, contains 2,300 pounds of specially treated graphite coated filters to remove siloxanes, and trace toxic air contaminants (TAC). Based on fuel analysis of the raw digester gas and permit conditions, the TAC concentration is as follows: benzene <110 ppb, chlorobenzene < 7 ppb, perchloroethylene <7 ppb, dichlorobenzene <294 ppb, ethyl benzene <45 ppb, toluene < 716 ppb, trichlorothylene <3 ppb, chloroform <38 ppb, and xylenes < 200 ppb . Although the gas flow is split between the two vessels, one vessel has the capacity to handle all gas while maintenance is conduced on the second vessel.

Figure 1 - Digester Gas Sulfur and Siloxane Removal System for Fuel Cell Cogen Facility
EMWD Moreno Valley, POTW, ID No.13088
Appl.No.473542



After the gas exits the siloxane removal vessels, a particulate filter is used to prevent entrainment of the adsorbent in the gas stream. Then the treated digester gas stream is suitable as a fuel for the fuel cell because the contaminant levels are reduced to less than 3 ppmv H2S, and 0.1 ppmv siloxanes. The fuel cell can tolerate a maximum H2S concentration of 6.1 ppmv.

The treated digester gas is sent to the fuel cell where the fuel is converted to hydrogen which is electrochemically reacted with oxygen to produce electricity and heat. The fuel cell is a molten carbonate type which has an operating temperature of 1200 degrees F. This type of fuel cell uses a preconverter to convert non-methane hydrocarbons to methane, and an internal reformer to convert the fuel from methane to hydrogen before the hydrogen is reacted electrochemically to water and CO2. In addition, small quantities of NOx, SOx, CO, VOC, and PM10 are also generated.

The exhaust from each fuel cell is passed through a heat exchanger before the exhaust gas is vented to the atmosphere through separate stacks. The exhaust air is vented at an exit temperature of approximately 700 degrees F.

EMISSIONS

The TOC and TAC emissions from the digester gas desulphurization system is estimated in Appendix B, based on the concentration of contaminants in the digester gas fuel analysis, and 6.1 ppmv H2S concentration which is the maximum tolerable H2S concentration of the Fuel Cell. The sulfur capture efficiency of the desulphurization unit, and the TOC capture efficiency of the siloxane treatment vessel and the fuel cell are both estimated at 95%. Appendix B also estimates the criteria emissions from the Fuel Cell which is added to the emission from the digester gas desulphurization and siloxane system. The criteria emissions are based on ARB certified emission factors and manufacturer emissions specifications and test results from a 250 kw unit operated under application No. 416049 by the LA City Bureau of Sanitation Terminal Island Treatment Plant.

The operating schedule is 24 hrs per day, 7 days per week, and 52 weeks per year.

The maximum daily controlled emissions are estimated as 0.43 lbNOx, 2.16 lbCO, 0.02 lbSOX, 0.22 lbPM10, and 0.43 lbTOC.

EVALUATION

Rule 212

The project involves a new source of emissions. Since (1) the maximum daily emissions are below Rule 212 thresholds, (2) the health risk is below 1 in a million, and (3) there is no school within 1000 feet from the facility, no public notice is required.

Rule 401

No visible emissions are expected from the normal operation of this equipment. Therefore compliance with Rule 401 is expected.

Rule 402

No nuisance complaints are expected from the normal operation of this equipment. Therefore, compliance with this Rule is expected.

Rule 431.1

The fuel cell will oxidize the small remaining amound of sulfur compounds in the fuel. The facility Sox emissions are less than 5 pounds per day, as H2S, and the system would comply with Rule 431.1, by exemption (g)(8).

Rule 1303- New Source Review

Although the digester gas desulphurization system does not directly generate criteria pollutants, the operation of the fuel cell generates criteria pollutants. Since the emissions estimated in appendix B are below the screening limits in Table A-1 of Rule 1303, modeling is not required. No offsets are required because the equipment supports the operation of the POTW and is an essential public service, and the only pollutant which is greater than 1 lb/day is CO, which is an attainment air pollutant.

A source test will be conducted to verify compliance with permit conditions. Therefore, compliance with Rule 1303 is expected.

Table 1 - Current and proposed NSR Balance

Appl.No.	Rating MW/hr	NOx lb/day	CO lb/day	ROG lb/day	PM10 lb/day	SOx lb/day
Current Bal.		62	290	133	13	8
473542	0.9	0	2	0	0	0
New Balance		62	292	133	13	8

Rule 1401

Based permit conditions and a destruction efficiency of 95%, the estimated MICR is expected to be less than one in a Million as determined by a Tier II risk assessment, and the system would comply with 1401 without T-BACT.

Rule 1401.1

Since this facility was constructed under AQMD permits which were issued prior to November 4, 2005, this is an existing facility as defined in section (c)(3)(A), which is exempt from Rule 1401.1 .

Rule 3004

A deminimus significant permit revision con be recommended under Application No. 474813, because the equipment proposed under Application No. 473542 meet the criteria listed in Table 3-8, De Minimis Significant Permit Revision Criteria, in the Technical Guidance Document for Title V dated January 1998.

There is no CAM Plan requirement because there is there is no applicable emission limit or standard, this is not a large source, and the initial Title V permit was filed before April 1998. The existing conditions in the Title V facility permit in Sections D, E, and K, are sufficient to assure compliance with the monitoring, recordkeeping, and reporting required by Title V.

Since the Facility has certified compliance with all Rules and Regulations, and there is no recent NOV or NOC issued by the AQMD, a deminimus significant revision to the Title V Facility Permit, can be recommended subject to EPA Review.

CEQA

Since the proposed digester gas treatment and fuel cell will utilize digester gas generated from the existing anerobic digesters which is burned in the existing cogen plant or flare, there is negligible expansion of the capacity of existing facility associated with application no. 473542. Therefore, no CEQA evaluation is required because the proposed construction is categorically exempt and it is considered a minor alteration of an existing facility which is a publically owned waste-water treatment plant.

RECOMMENDATION

Since the proposed construction is expected to comply with all SCAQMD Rules and Regulations, application number 473542 is recommended for a permit to construct with the proposed equipment descriptions and permit conditions. A deminimus significant revision to the Title V facility permit issued on April 3, 2007, is recommended under application No. 474813 subject of a 45 day EPA review period.

APPENDIXES

A. NSR TRANSACTION REPORT
B. Emissions Estimate
C. Risk Assessment

APPENDIX A
NSR TRANSACTION REPORT

APPENDIX B
Emissions Estimate

APPENDIX C
Risk Assessment